

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER

112740-518

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/049397

INTERNATIONAL APPLICATION NO.  
PCT/DE00/02331

INTERNATIONAL FILING DATE  
18 July 2000

PRIORITY DATE CLAIMED  
12 August 1999

TITLE OF INVENTION

METHOD FOR MONITORING THE POSITION OF A MOBILE COMMUNICATION TERMINAL FOR  
LOCATION DEPENDENT TELECOMMUNICATION SERVICES AND AN ACTIVE VOICE CONNECTION

APPLICANT(S) FOR DO/EO/US

Alexander Aschir et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☒ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☒ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☐ Other items or information:

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.492 (a)) <b>10/049397</b>		INTERNATIONAL APPLICATION NO. <b>PCT/DE00/02331</b>		ATTORNEY'S DOCKET NUMBER <b>112740-518</b>	
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24. The following fees are submitted:				<b>CALCULATIONS PTO USE ONLY</b>	
<b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :</b>					
<input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO .....				<b>\$1040.00</b>	
<input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO .....				<b>\$890.00</b>	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO .....				<b>\$740.00</b>	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) .....				<b>\$710.00</b>	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) .....				<b>\$100.00</b>	
<b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>\$890.00</b>	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				<b>\$0.00</b>	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x \$18.00	<b>\$0.00</b>	
Independent claims	1 - 3 =	0	x \$84.00	<b>\$0.00</b>	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$890.00</b>	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				<b>\$0.00</b>	
<b>SUBTOTAL =</b>				<b>\$890.00</b>	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				<b>\$0.00</b>	
<b>TOTAL NATIONAL FEE =</b>				<b>\$890.00</b>	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
<b>TOTAL FEES ENCLOSED =</b>				<b>\$890.00</b>	
				Amount to be:	\$
				refunded	\$
				charged	\$

a. ☒ A check in the amount of **\$890.00** to cover the above fees is enclosed.

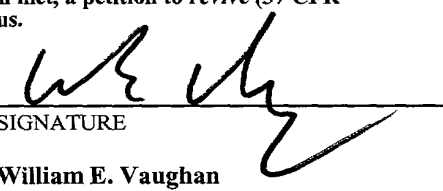
b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **02-1818**. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

William E. Vaughan (Reg. No. 39,056) Bell, Boyd & Lloyd LLC P.O. Box 1135 Chicago, Illinois 60690 312-807-4292	<div style="text-align: center;">           SIGNATURE          William E. Vaughan          NAME          39,056          REGISTRATION NUMBER          February 11, 2002          DATE       </div>
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BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE  
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE  
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

**PRELIMINARY AMENDMENT**

APPLICANTS: Alexander Aschir et al. DOCKET NO.: 112740-518  
SERIAL NO: GROUP ART UNIT:  
FILED: EXAMINER:  
INTERNATIONAL APPLICATION NO.: PCT/DE00/02331  
INTERNATIONAL FILING DATE 18 July 2000  
INVENTION: METHOD FOR MONITORING THE POSITION OF A  
MOBILE COMMUNICATION TERMINAL FOR  
LOCATION DEPENDENT TELECOMMUNICATION  
SERVICES AND AN ACTIVE VOICE CONNECTION

Assistant Commissioner for Patents,  
Washington, D.C. 20231

10

Sir:

Please amend the above-identified International Application before entry  
into the National stage before the U.S. Patent and Trademark Office under 35  
U.S.C. §371 as follows:

15 **In the Specification:**

Please replace the Specification of the present application, including the  
Abstract, with the following Substitute Specification:

SPECIFICATION

TITLE OF THE INVENTION

20

METHOD FOR MONITORING THE POSITION OF A MOBILE  
COMMUNICATION TERMINAL FOR LOCATION DEPENDENT  
TELECOMMUNICATION SERVICES AND AN ACTIVE VOICE  
CONNECTION

## BACKGROUND OF THE INVENTION

Location dependent telecommunication services (*Location Dependent Services*) are becoming more and more significant in mobile radio networks.

5 A known technology for implementing such and other telecommunication services in telecommunication networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the  
10 connection is set up is currently assessed.

In this context, the location of the terminal can, up until now, be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a mobile radio  
15 network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example, the SCP, Service Control Point) is given no kind of indication about the change of location.

The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the service  
20 customer starts a telephone call within a privileged radio cell (Home Zone), the call is billed at a cheaper rate. This situation also does not change if he/she leaves this radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within his/her own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

25 The same applies for the opposite direction: if the service customer starts a telephone call outside his/her Home Zone and enters his/her Home Zone during the call, then his/her telephone call is billed at the higher rate in his/her Home Zone too.

The same problem also arises when the customer using the location dependent service, which uses this billing model, for example, is called (Mobile  
30 Terminating Call, MTC).

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This concerns all the position-dependent characteristics of a telecommunication service; for example, including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

5        Techniques for position finding are already known. Delay time measurements can be used to establish the location of the mobile terminal with an accuracy of approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

10       Both solutions are complex and cost intensive. They also provide much more accurate position details than are needed for the telecommunication services described.

It is an object of the present invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and, at the  
15       same time, avoids the drawbacks cited above.

#### SUMMARY OF THE INVENTION

A key feature of the present invention is that the telecommunication service, which can be activated by the A-party (that is to say, by the calling party, MOC) or by the B-party (that is to say, by the called party, MTC), is location dependent. As  
20       such, it may be subject to different billing models, or else that other service features (Features) may differ depending on location.

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a  
25       change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center; that is to say, a change to the billing model used, for example.

Once the telecommunication service becomes aware of the changes of position, the service center (for example, the SCP in an IN) can then react to the  
30       change during the call, a service characteristic which has not been available to date.

An advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to implement, even if it is not as accurate.

5       The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

The change of position can, in principle, be initiated:

- via the terminal:  
10       In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant) change of position or else at regular intervals and also a combination of the two.
- via the service center:  
15       In another embodiment, the position of the terminal is requested by the service center. This can be done at regular intervals.

In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in  
20   the format used by the service center, the service center needs to convert it into suitable position information after reception.

The regularity and the intervals with/at which position information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

Additional features and advantages of the present invention are described in,  
25   and will be apparent from, the following Detailed Description of the Invention and the Figures.

#### BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes  
30   during a call.

Figure 2 shows a solution variant initiated by the SCP.

Figure 3 shows a solution variant initiated by the terminal.

#### DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a mobile radio network of cellular design containing a few  
5 radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC,  
V-BSC, illustrated by triangles, which control the radio traffic for the cell in  
question. These apparatuses are connected to a central controller MSC which has  
access to subscriber registers HLR and VLR. These techniques are known to the  
person skilled in the art of GSM (Global System for Mobile Communication)  
10 technology, but other cellular radio networks such as PCN (Personal  
Communication Network) or the like are also conceivable.

A subscriber in this mobile radio network now uses his/her terminal MT  
(Mobile Terminal) to dial another subscriber number and, thus, obtains a  
connection to the network in his/her radio cell FZ1. The location of the second  
15 subscriber B-Party and his/her exchange M-SSP are not relevant to the inventive  
method.

This radio cell is linked to a particular characteristic in the service center.  
This may be a particular billing system referred to by the operator as the Home  
Zone, and this connection is thus billed using a separate billing model.

20 If the subscriber now moves, leaves the Home Zone and enters the  
neighboring radio cell FZ3, the central controller is informed about this change of  
position, as shown in Figures 2 and 3.

The position is transmitted to the service center during the telephone call via  
additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for  
25 example. In this context, location information available in MT and/or location  
changes are transmitted. Parameters which are available are, by way of example,  
"Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control  
30 center SCP asks at service-specific time intervals whether the

telephoning subscriber A-Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address CdPA in the case of MTC services) which tells the SIM toolkit of the MS to respond with a USSD Response containing location information and/or location changes.

- MS initiates: Figure 3. In the event of handover, the MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength. In this case, however, there has been no change of location relevant to the service provider. To prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time controller also can be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable time period, but immediately once this time period has elapsed.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.



## ABSTRACT OF THE DISCLOSURE

- A method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection,
- 5 wherein to guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection, such that if a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

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**In the Claims:**

On page 8, cancel line 1 and substitute the following left hand justified heading therefor:

5    CLAIMS

        Please cancel claims 1-8, without prejudice, and substitute the following claims therefor.

9.    A method for monitoring a position of a mobile communication  
10   terminal for location dependent telecommunication services and an active voice connection, the method comprising the steps of:

        obtaining, via a service control center in the mobile radio network, a  
first information item relating to the position of the mobile communication terminal  
within the mobile radio network from the mobile communication terminal when a  
15   connection for a call is set up;

        using the first position information item by selected location  
dependent telecommunication services;

        checking again the position of the mobile communication terminal  
during the call;

20          using, by the service control center, a change of position established during the call which has been set up to obtain a second position information item from the mobile communication terminal; and

        using the second position information item by the  
telecommunication services.

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10. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the steps of:

making billing for a telecommunication service dependent on the position information item for the mobile communication terminal to be billed; and

5 adjusting the billing for the telecommunication service if a change in the position of the terminal is established.

11. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of:

10 requesting the position information item for the mobile communication terminal from the mobile communication terminal by the service control center.

12. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of requesting a position information item at regular intervals.

13. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of reporting a position information item at regular intervals.

14. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of reporting the position after a change of position.

15. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of ascertaining location information available in the mobile communication terminal by an SIM tool kit available at the mobile communication terminal.

16. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of transmitting a position information item by Unstructured Supplementary Service Data.

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17. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of transmitting a position information item by Short Message Service.

#### REMARKS

10 The present amendment makes editorial changes and corrects typographical errors in the specification, which includes the Abstract, in order to conform the specification to the requirements of United States Patent Practice. No new matter is added thereby.

15 Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Versions with Markings to Show Changes Made."**

20 In addition, the present amendment cancels original claims 1-8 in favor of new claims 9-17. Claims 9-17 have been presented solely because the revisions by crossing out underlining which would have been necessary in claims 1-8 in order to present those claims in accordance with preferred United States Patent Practice would have been too extensive, and thus would have been too burdensome. The present amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 25 of the Applicants to surrender any of the subject matter of claims 1-8.

Early consideration on the merits is respectfully requested.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY



William E. Vaughan

Reg. No. 39,056

P.O. Box 1135

Chicago, Illinois 60690-1135

Phone: (312) 807-4282

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Specification:**

Description

**SPECIFICATION**

- 5        Method for monitoring the position of a mobile communication terminal for  
location dependent telecommunication services and an active voice connection

**TITLE OF THE INVENTION**

**"METHOD FOR MONITORING**

**THE POSITION OF A MOBILE COMMUNICATION**

- 10        **TERMINAL FOR LOCATION DEPENDENT TELECOMMUNICATION**  
**SERVICES AND AN ACTIVE VOICE CONNECTION"**

**BACKGROUND OF THE INVENTION**

**Technical field of the invention**

- 15        Location dependent telecommunication services (*Location Dependent Services*) are becoming more and more significant in mobile radio networks.

A known technology for implementing such and other telecommunication services in telecommunication networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

- 20        For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the connection is set up is currently assessed.

- 25        In this context, the location of the terminal can, up to until now, be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a mobile radio network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example, the SCP, Service Control Point) is given no kind of indication about the change of location.

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The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the service customer starts a telephone call within a privileged radio cell (Home Zone), the call is billed at a cheaper rate. This situation also does not change if he/she leaves this  
5 radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within he/she own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

The same applies for the opposite direction: if the service customer starts a telephone call outside his/her Home Zone and enters his/her Home Zone during the  
10 call, then his/her telephone call is billed at the higher rate in his/her Home Zone too.

The same problem also arises when the customer using the location dependent service, which uses this billing model, for example, is called (Mobile Terminating Call, MTC).

This concerns all the position-dependent characteristics of a  
15 telecommunication service; for example, including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

#### **Prior art**

Techniques for position finding are already known. Delay time  
20 measurements can be used to establish the location of the mobile terminal with an accuracy of approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

Both solutions are complex and cost intensive. They also provide much  
25 more accurate position details than are needed for the telecommunication services described.

It is an object of the present invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and, at the same time, avoids the drawbacks cited above.

#### **30 Description of the invention**

This object is achieved by a method in accordance with patent claim 1.  
In this context, an extension is described below for telecommunication services (MOC and MTC).

5

### SUMMARY OF THE INVENTION

The A key feature fundamental to of the present invention is that the telecommunication service, which can be activated by the A-party (that is to say, by the calling party, MOC) or by the B-party (that is to say, by the called party, MTC), is location dependent. ~~This may mean that it is~~ As such, it may be subject to  
10 different billing models, or else that other service features (Features) may differ depending on location.

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a  
15 change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center; that is to say, a change to the billing model used, for example.

Once the telecommunication service becomes aware of the changes of position, the service center (for example, the SCP in an IN) can then react to the  
20 change during the call, a service characteristic which has not been available to date.

The An advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to implement, even if it is not as  
25 accurate.

~~Advantageous refinements and developments are specified in the subclaims.~~

The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

30 The change of position can, in principle, be initiated:



- via the terminal:

In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant) change of position or else at regular intervals and also a combination of the two.

- via the service center:

In another embodiment, the position of the terminal is requested by the service center. This can be done at regular intervals.

10 In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in the format used by the service center, the service center needs to convert it into suitable position information after reception.

15 The regularity and the intervals with/at which position information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

#### **~~Brief description of the drawings~~**

#### 20 BRIEF DESCRIPTION OF THE FIGURES

The invention is explained below using exemplary embodiments, where

Figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes during a call,

25 Figure 2 shows a solution variant initiated by the SCP, and,

Figure 3 shows a solution variant initiated by the terminal.

#### **~~Description of the preferred embodiments~~**

#### DETAILED DESCRIPTION OF THE INVENTION

30 Figure 1 shows a mobile radio network of cellular design containing a few radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC,

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V-BSC, illustrated by triangles, which control the radio traffic for the cell in question. These apparatuses are connected to a central controller MSC which has access to subscriber registers HLR and VLR. These techniques are known to the person skilled in the art of GSM (Global System for Mobile Communication) technology, but other cellular radio networks such as PCN (Personal Communication Network) or the like are also conceivable.

A subscriber in this mobile radio network now uses his/her terminal MT (Mobile Terminal) to dial another subscriber number and, thus, obtains a connection to the network in his/her radio cell FZ1. The location of the second subscriber B-Party and his/her exchange M-SSP are not relevant to the inventive method.

This radio cell is linked to a particular characteristic in the service center. This may be a particular billing system referred to by the operator as the Home Zone, and this connection is thus billed using a separate billing model.

If the subscriber now moves, leaves the Home Zone and enters the neighboring radio cell FZ3, the central controller is informed about this change of position, as shown in the two subsequent figures Figures 2 and 3.

The position is transmitted to the service center during the telephone call by means of via additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for example. In this context, location information available in MT and/or location changes are transmitted. Parameters which are available are, by way of example, "Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control center SCP asks at service-specific time intervals whether the telephoning subscriber A-Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address

CdPA in the case of MTC services) which tells the SIM toolkit of the MS to respond with a USSD Response containing location information and/or location changes.

- 5           •       MS initiates: Figure 3. In the event of handover, the MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength; ~~in~~. In this case, however, there has been no change of location relevant to the service provider. To
- 10       prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time controller ~~can~~ also can be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable time period, but immediately once this time period has elapsed.
- 15       Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

Abstract

ABSTRACT OF THE DISCLOSURE

A method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection, wherein to guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection. If, such that if a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

10

Figure 1

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## Description

Method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection

## Technical field of the invention

10 Location dependent telecommunication services (*Location Dependent Services*) are becoming more and more significant in mobile radio networks.

A known technology for implementing such and other telecommunication services in telecommunication networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

20 For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the connection is set up is currently assessed.

In this context, the location of the terminal can up to now be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a mobile radio network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example the SCP, Service Control Point) is given no kind of indication about the change of location.

35

The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the

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service customer starts a telephone call within a  
privileged radio cell (Home Zone), the

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call is billed at a cheaper rate. This situation also does not change if he leaves this radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within his  
5 own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

The same applies for the opposite direction: if the service customer starts a telephone call outside his  
10 Home Zone and enters his Home Zone during the call, then his telephone call is billed at the higher rate in his Home Zone too.

The same problem also arises when the customer using  
15 the location dependent service, which uses this billing model, for example, is called (Mobile Terminating Call, MTC).

This concerns all the position-dependent  
20 characteristics of a telecommunication service, for example including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

## 25 **Prior art**

Techniques for position finding are already known. Delay time measurements can be used to establish the location of the mobile terminal with an accuracy of  
30 approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

Both solutions are complex and cost intensive. They  
35 also provide much more accurate position details than are needed for the telecommunication services described.

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It is an object of the invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and at the same time avoids the drawbacks cited above.

5

### Description of the invention

This object is achieved by a method in accordance with patent claim 1.

10

In this context, an extension is described below for telecommunication services (MOC and MTC).

15

The feature fundamental to the invention is that the telecommunication service, which can be activated by the A-party (that is to say by the calling party, MOC) or by the B-party (that is to say by the called party, MTC), is location dependent. This may mean that it is subject to different billing models, or else that other service features (Features) differ depending on location.

20

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center, that is to say a change to the billing model used, for example.

25

30

Once the telecommunication service becomes aware of the changes of position, the service center (for example the SCP in an IN) can then react to the change during the call - a service characteristic which has not been available to date.

35

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The advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to  
5 implement, even if it is not as accurate.

Advantageous refinements and developments are specified in the subclaims.

10 The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

15 The change of position can, in principle, be initiated:  
- via the terminal:

In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant)  
20 change of position or else at regular intervals and also a combination of the two.

- via the service center:

In another embodiment, the position of the terminal is requested by the service center. This can be done  
25 at regular intervals.

In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in  
30 the format used by the service center, the service center needs to convert it into suitable position information after reception.

The regularity and the intervals with/at which position  
35 information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

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**Brief description of the drawings**

The invention is explained below using exemplary embodiments, where

- 5 figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes during a call,
- figure 2 shows a solution variant initiated by the SCP, and
- 10 figure 3 shows a solution variant initiated by the terminal.

**Description of the preferred embodiments**

- 15 Figure 1 shows a mobile radio network of cellular design containing a few radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC, V-BSC, illustrated by triangles, which control the radio
- 20 traffic for the cell in question. These apparatuses are connected to a central controller MSC which has access to subscriber registers HLR and VLR. These techniques are known to the person skilled in the art of GSM (Global System for Mobile Communication) technology,
- 25 but other cellular radio networks such as PCN (Personal Communication Network) or the like are also conceivable.

- A subscriber in this mobile radio network now uses his
- 30 terminal MT (Mobile Terminal) to dial another subscriber number and thus obtains a connection to the network in his radio cell FZ1. The location of the second subscriber B-Party and his exchange M-SSP are not relevant to the inventive method.

- 35 This radio cell is linked to a particular characteristic in the service center. This may be a particular billing system referred to by the operator

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as the Home Zone, and this connection is thus billed using a separate billing model.

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If the subscriber now moves, leaves the Home Zone and enters the neighboring radio cell FZ3, the central controller is informed about this change of position, as shown in the two subsequent figures.

5

The position is transmitted to the service center during the telephone call by means of additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for example. In this context, location information available in MT and/or location changes are transmitted. Parameters which are available are, by way of example, "Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

15 Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control center SCP asks at service-specific time intervals whether the telephoning subscriber A-Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address CdPA in the case of MTC services) which tells the SIM toolkit of the MS to respond with a USSD Response containing location information and/or location changes.
- MS initiates: Figure 3. In the event of handover, the MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength; in this case, however, there has been no change of location relevant to the service provider. To prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time

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controller can also be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable

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time period, but immediately once this time period has elapsed.

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Patent claims

1. A method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection, in which
  - the service control center in the mobile radio network obtains a first information item relating to the position of the mobile terminal within the mobile radio network from the terminal when a connection is set up, and
  - the first position information item is used by the selected location dependent telecommunication services, and
  - the position of the terminal is checked again during the call, and
  - the service control center uses a change of position established during the call which has been set up to obtain a second position information item from the terminal, and
  - the second position information item is used by the telecommunication [lacuna].
2. The method as claimed in patent claim 1, characterized in that
  - a) the billing for the telecommunication service is dependent on the position information item for the terminal which is to be billed, and
  - b) if a change in the position of the terminal is established,
  - c) the billing for the telecommunication service is adjusted.
3. The method as claimed in patent claim 1, characterized in that
  - a position information item for the terminal is requested from the terminal by the service center.

AMENDED SHEET

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4. The method as claimed in one of the preceding patent claims,  
characterized in that  
a position information item is requested or  
reported at regular intervals.
- 5
5. The method as claimed in patent claim 1 or 2,  
characterized in that  
the position is reported after a change of  
position.
- 10
6. The method as claimed in one of the preceding patent claims,  
characterized in that  
the location information available in the terminal  
is ascertained by SIM toolkit available [lacuna]  
terminal.
- 15
7. The method as claimed in one of the preceding patent claims,  
characterized in that  
a position information item is transmitted by  
Unstructured Supplementary Service Data (USSD).
- 20
8. The method as claimed in one of the preceding patent claims,  
characterized in that  
a position information item is transmitted by  
Short Message Service (SMS).
- 25



### **Abstract**

Method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection. If a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

Figure 1

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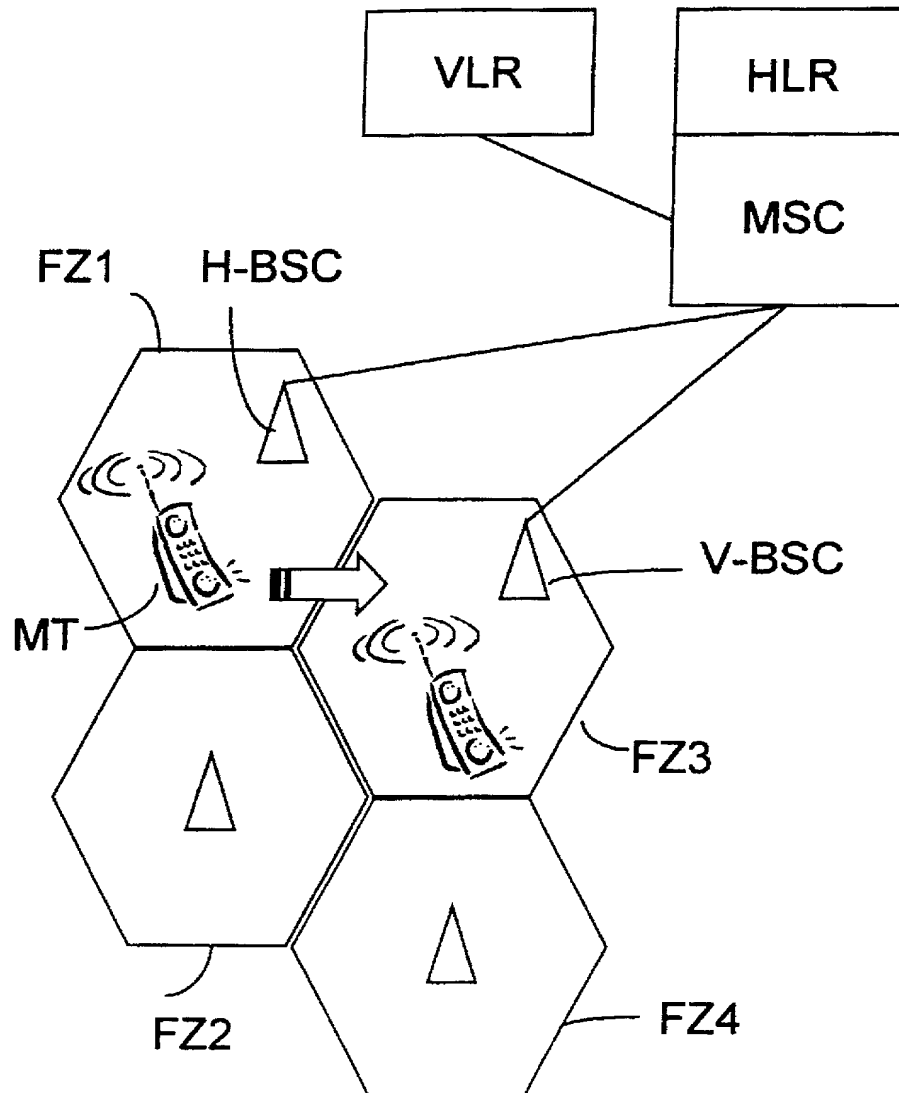


FIG 1

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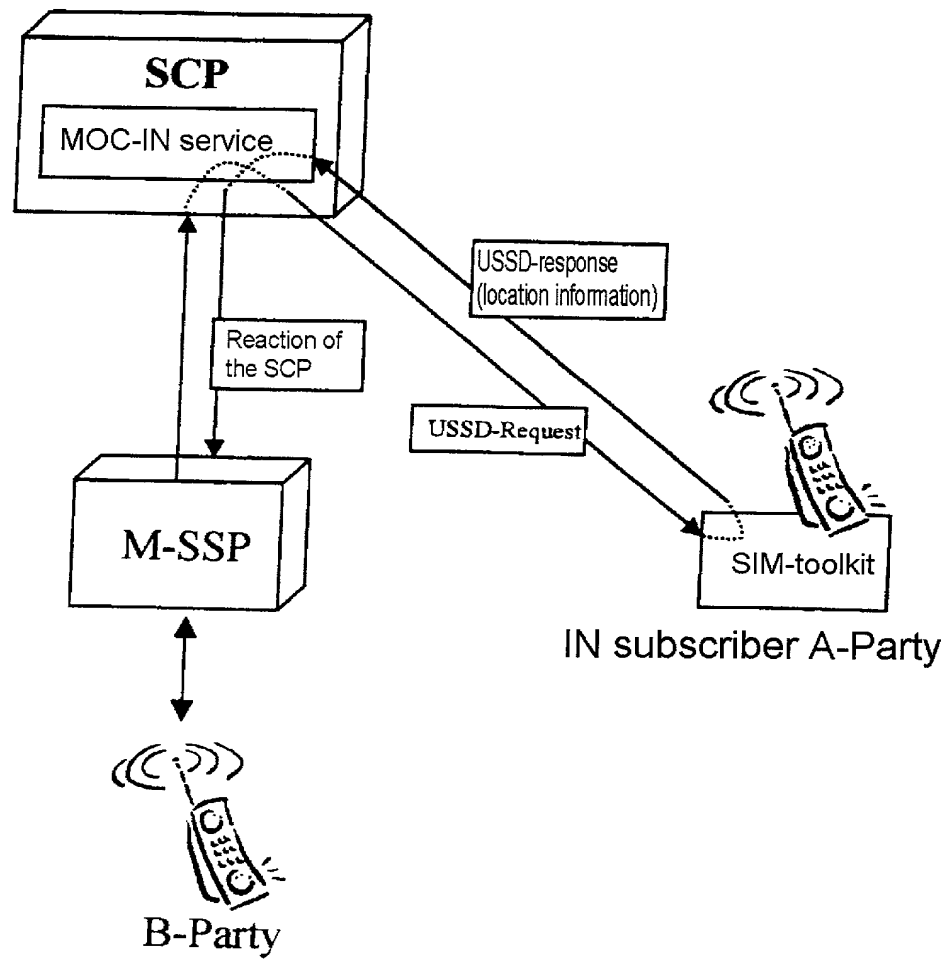


FIG 2

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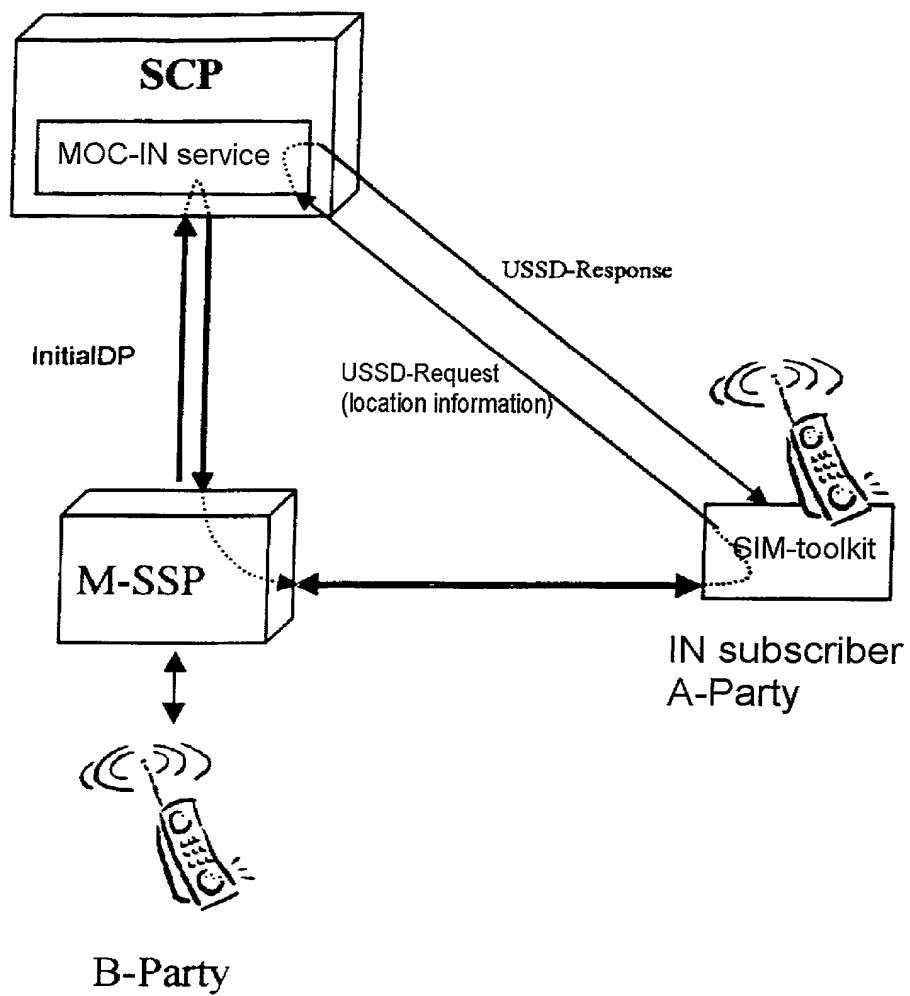


FIG 3

# Declaration and Power of Attorney For Patent Application

## Erklärung Für Patentanmeldungen Mit Vollmacht

### German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zur Überwachung der Position  
eines mobilen  
Kommunikationsendgerätes bei  
ortsabhängigen Telekommunikations-  
Diensten und aktiver Sprachverbindung

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigelegt ist.

☒ am 18.07.2000 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/DE00/02331

eingereicht wurde und am

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method for monitoring the position of a  
mobile communication terminal in  
location-dependent telecommunication  
services and active voice link

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 18.07.2000 as

PCT international application

PCT Application No. PCT/DE00/02331

and was amended on

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

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# German Language Declaration

Prior foreign applications  
Priorität beansprucht

Priority Claimed

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DE

12.08.1999

☒

☐

(Number)

(Country)

(Day Month Year Filed)

Yes

No

(Nummer)

(Land)

(Tag Monat Jahr eingereicht)

Ja

Nein

(Number)

(Country)

(Day Month Year Filed)

☐

☐

(Nummer)

(Land)

(Tag Monat Jahr eingereicht)

Yes

No

Ja

Nein

(Number)

(Country)

(Day Month Year Filed)

☐

☐

(Nummer)

(Land)

(Tag Monat Jahr eingereicht)

Yes

No

Ja

Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/02331

(Application Serial No.)  
(Anmeldeseriennummer)

18.07.2001

(Filing Date D, M, Y)  
(Anmeldedatum T, M, J)

anhängig

(Status)  
(patentiert, anhängig,  
aufgegeben)

pending

(Status)  
(patented, pending,  
abandoned)

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date D,M,Y)  
(Anmeldedatum T, M, J)

(Status)  
(patentiert, anhängig,  
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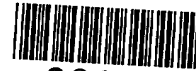
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29177

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(Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

Ext. \_\_\_\_\_

Postanschrift:

Send Correspondence to:

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Three First National Plaza, 70 West Madison Street, Suite 3300 60602-4207 Chicago, Illinois  
Telephone: (001) 312 372 11 21 and Facsimile (001) 312 827 8185

or

Customer No. 29177

Voller Name des einzigen oder ursprünglichen Erfinders: <b>ALEXANDER ASCHIR</b>		Full name of sole or first inventor: <b>ALEXANDER ASCHIR</b>	
Unterschrift des Erfinders <i>Alexander Aschir</i>	Datum <i>10.01.2002</i>	Inventor's signature	Date
Wohnsitz <b>Bangalore, INDIEN</b>		Residence <b>Bangalore, INDIA</b>	
Staatsangehörigkeit <b>DE</b>		Citizenship <b>DE</b> <i>DEX</i>	
Postanschrift <b>7th Cross Lavallo Road 12, Appatement 12</b>		Post Office Address <b>7th Cross Lavallo Road 12, Appatement 12</b>	
<b>IN-560001 Bangalore</b>		<b>IN-560001 Bangalore</b>	
<b>INDIA</b>		<b>INDIA</b>	
Voller Name des zweiten Miterfinders (falls zutreffend): <b>Dr. ANDREAS BERG</b>		Full name of second joint inventor, if any: <b>Dr. ANDREAS BERG</b>	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz <b>BERLIN, DEUTSCHLAND</b>		Residence <b>BERLIN, GERMANY</b>	
Staatsangehörigkeit <b>DE</b>		Citizenship <b>DE</b>	
Postanschrift <b>SEEGEFELDER WEG 262a</b>		Post Office Address <b>SEEGEFELDER WEG 262a</b>	
<b>13591 BERLIN</b>		<b>13591 BERLIN</b>	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

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And I hereby appoint

Customer No. 29177

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(Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

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Telephone: (001) 312 372 11 21 and Facsimile (001) 312 827 8185  
or  
Customer No. 29177

Voller Name des einzigen oder ursprünglichen Erfinders: <b>ALEXANDER ASCHIR</b>		Full name of sole or first inventor: <b>ALEXANDER ASCHIR</b>	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
Wohnsitz <b>Bangalore, INDIEN</b>		Residence <b>Bangalore, INDIA</b>	
Staatsangehörigkeit <b>DE</b>		Citizenship <b>DE</b>	
Postanschrift <b>7th Cross Lavalie Road 12, Appatement 12</b>		Post Office Address <b>7th Cross Lavalie Road 12, Appatement 12</b>	
<b>IN-560001 Bangalore</b> <b>INDIA</b>		<b>IN-560001 Bangalore</b> <b>INDIA</b>	
Voller Name des zweiten Miterfinders (falls zutreffend): <b>Dr. ANDREAS BERG</b>		Full name of second joint inventor, if any: <b>Dr. ANDREAS BERG</b>	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz <b>BERLIN, DEUTSCHLAND</b>		Residence <b>BERLIN, GERMANY</b>	
Staatsangehörigkeit <b>DE</b>		Citizenship <b>DE</b>	
Postanschrift <b>SEEGEFELDER WEG 262a</b>		Post Office Address <b>SEEGEFELDER WEG 262a</b>	
<b>13591 BERLIN</b>		<b>13591 BERLIN</b>	

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(Supply similar information and signature for third and subsequent joint inventors).

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